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(56) Documents Cited

EP 0046926 A1 **WO 94/02086 A1** **US 5704946 A**
US 5645604 A **US 5405398 A** **US 5092894 A**
WPI Abstract Acc. No. 95-149168 and FR002710837A1

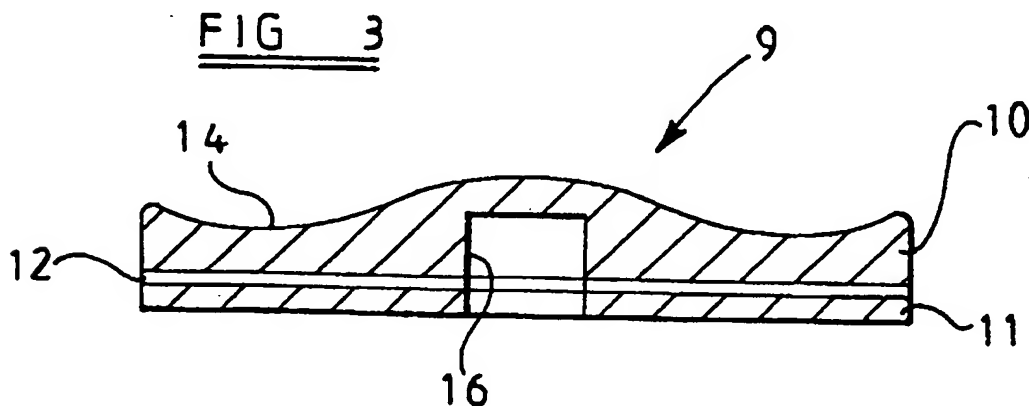
(58) Field of Search

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Online:WPI,EPODOC,JAPIO

(54) Abstract Title

A knee prosthesis

(57) A knee prosthesis includes a compressible meniscal or tibial component. In one example, the meniscal component 9 comprises superior and inferior parts 10 and 11 of non-compressible wear resistant material, such as ultra high molecular weight polyethylene, and an intermediate compressible layer 12, typically formed of biocompatible silicone elastomer, between the superior and inferior parts.



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FIG 1

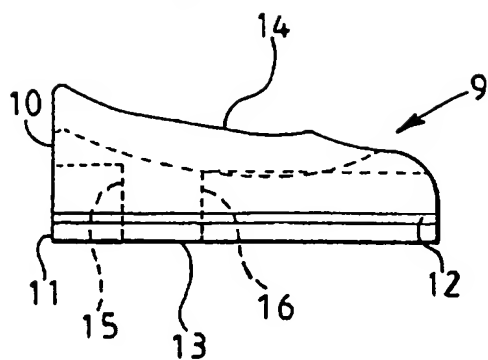


FIG 2

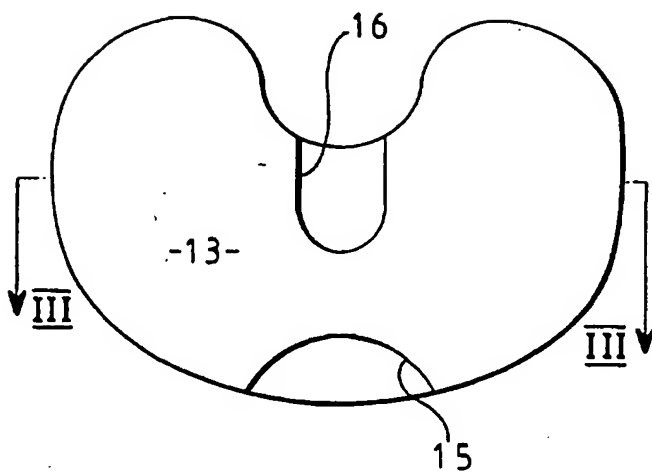


FIG 3

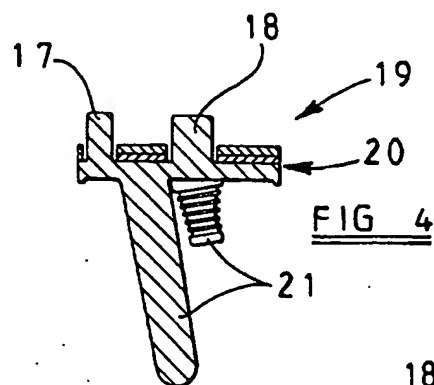
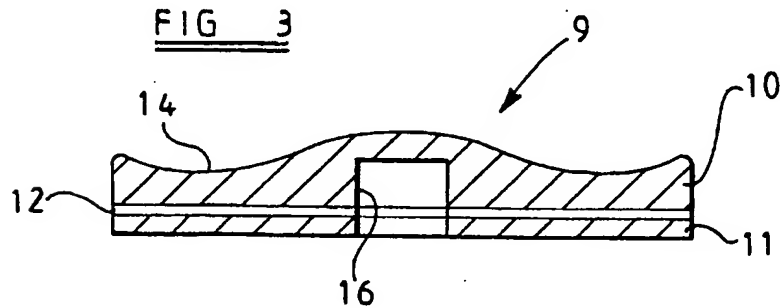


FIG 4

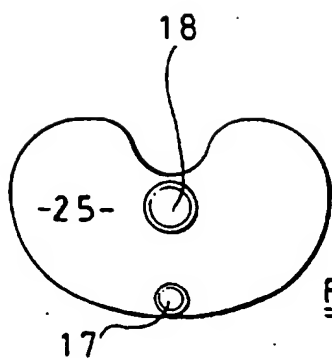


FIG 5

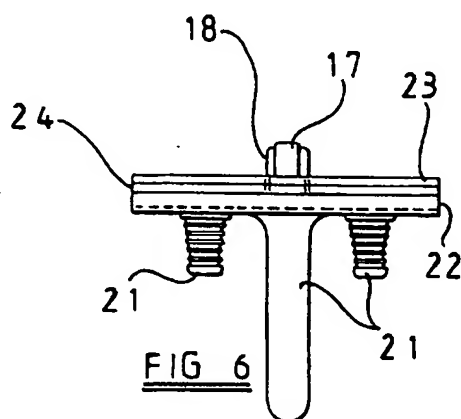


FIG 6

A KNEE PROSTHESIS

This invention relates to a knee prosthesis.

5 It is now known that the natural meniscus in a healthy knee joint moves anteriorly-posteriorly, rotates, moves medially-laterally and expands and contracts during flexion and extension.

 According to the present invention there is provided a knee prosthesis
10 including a compressible meniscal or tibial component.

 Preferred and/or optional features of the invention are set forth in claims 2 to 13, inclusive.

15 The invention will now be more particularly described, by way of example, with reference to the accompanying drawings, in which:-

 Figure 1 is a side view of a meniscal component of a knee prosthesis according to one embodiment of the invention,

20

 Figure 2 is a bottom plan view of the meniscal component shown in Figure 1,

 Figure 3 is a section taken through the line III - III of Figure 2,

Figure 4 is a sectional view of a tibial component of a knee prosthesis according to a second embodiment of the invention,

Figure 5 is a top plan view of the tibial component shown in Figure 4,

5

Figure 6 is a front view of the tibial component shown in Figures 4 and 5.

Referring firstly to Figures 1 to 3 of the drawings, the meniscal component 9 of a total knee prosthesis shown therein comprises a superior part 10, an inferior part 11 and a layer 12 of compressible material between the superior and inferior parts 10 and 11, respectively.

The inferior surface 13 of the inferior part 11 of the meniscal component is generally planar and the superior surface 14 of the superior part 10 of the meniscal component comprises two condylar surfaces, one on either side of the centre, each having a radius of curvature which is replicated in the articulating area of a femoral component (not shown), such that the femoral component and the meniscal component, when in contact throughout the range of motion, are fully congruent.

20 The meniscal component also has two recesses 15 and 16 which co-operate with bollards 17 and 18 upstanding from a plateau of a tibial component 19 to allow limited anterior-posterior, medial-lateral and rotational movement between the meniscal and tibial components. These recesses 15 and 16 extend through the inferior part 11 and through the compressible layer 12 into the superior part 10 of the

meniscal component.

As shown, the superior and inferior parts 10 and 11 of the meniscal component are formed of ultra high molecular weight polyethylene and the compressible layer 12 is formed of a biocompatible compressible material, typically
5 silicone rubber. The superior and inferior parts could, however, be made of any biocompatible metallic material suitable for the purpose and typically of high carbon cobalt chromium alloy. These parts could also be made of a ceramic material, such as alumina or zirconia. The advantage of making these parts of metal or ceramics
10 material is that these materials are more wear resistant than polyethylene and the parts 10 and 11 can, therefore, be made thinner enabling the compressible layer 12 to be made thicker.

The superior and inferior parts 10 and 11 and the intermediate compressible
15 layer 12 are secured together by a biocompatible adhesive or by mechanical means or a combination of both.

Referring now to Figures 4 to 6 of the accompanying drawings, the tibial component 19 shown therein comprises a plateau 20 and fixing devices such as pegs
20 or stems 21. The plateau 20 comprises an inferior part 22, a superior part 23 and a layer 24 of compressible material between the inferior and superior parts 22 and 23, respectively. The superior surface 25 of the superior part 23 is flat for co-operation with an inferior surface of a meniscal component.

The bollards 17 and 18 are integral with the inferior part 22 and extend upwardly through openings in the compressible layer 24 and the superior part 23.

5 The inferior and superior parts 22 and 23, respectively, of the tibial component 19 and the pegs or stems 21 are made of a biocompatible metallic material suitable for the purpose and typically of a cobalt chromium alloy. They could also be made of a ceramic material, such as alumina or zirconia. The compressible layer 24 is formed of a biocompatible compressible material, typically silicone rubber.

10 The advantage of providing a knee prosthesis which allows for expansion and contraction during flexion and extension is that it would:-

1. Accommodate the differing extension/flexion gap during articulation by expanding and compressing from flexion to extension and *vice versa*, as does the meniscus in the natural knee.
15
2. As a result of an equalisation of tension through expansion and compression, there may be more even load transmission.
- 20 3. A meniscal component or a prosthetic knee, which will allow compression and expansion, will be more resistant to compressive load and shock.

4. The change in ligamentous tension will mimic the natural knee as the meniscus expands and compresses. As such, the knee will be in greater tension than with conventional knee prostheses throughout the range of motion which, in the case of a mobile meniscal knee, will provide a more stable construction and, therefore, resist meniscal dislocation or lift-off, which has been a problem reported in certain mobile meniscal knees.
5. The ability of the prosthetic knee to expand and compress will make implantation of the knee and ligament tension balancing more forgiving for the operating surgeon.
6. The expansion/compression process of the prosthetic knee will make it feel more natural to the patient.

15

The above embodiments are given by way of example only and various modifications will be apparent to persons skilled in the art without departing from the scope of the invention as defined by the appended claims. For example, the meniscal component could be fixed to the tibial component or could, indeed, be an integral part of the tibial component. Also, although the knee prosthesis as described above is a total knee prosthesis, it could be a uni-condylar knee prosthesis.

20

CLAIMS

1. A knee prosthesis including a compressible meniscal or tibial component.
- 5 2. A knee prosthesis as claimed in claim 1, wherein the meniscal component and tibial component are separate parts.
3. A knee prosthesis as claimed in claim 2, wherein the meniscal component is capable of anterior-posterior movement relative to the tibial component.
- 10 4. A knee prosthesis as claimed in claim 2 or claim 3, wherein the meniscal component is capable of rotational movement relative to the tibial component.
5. A knee prosthesis as claimed in any one of claims 2 to 4, wherein the
15 meniscal component is capable of medial-lateral movement relative to the tibial component.
6. A knee prosthesis as claimed in claim 1 or claim 2, wherein the meniscal component is fixed relative to the tibial component.
- 20 7. A knee prosthesis as claimed in any one of the preceding claims, wherein the meniscal component comprises superior and inferior non-compressible layers of wear resistant material and an intermediate compressible layer between the superior and inferior layers.

8. A knee prosthesis as claimed in claim 7, wherein the superior and inferior layers are of metal or ceramic material.

9. A knee prosthesis as claimed in any one of claims 1 to 7, wherein the tibial
5 component includes a plateau having superior and inferior non-compressible layers and an intermediate compressible layer between the superior and inferior layers.

10. A knee prosthesis as claimed in any one of claims 7 to 9, wherein the compressible layer is formed of a biocompatible material.

10

11. A knee prosthesis as claimed in claim 10, wherein the compressible layer is formed of silicone elastomer.

12. A knee prosthesis as claimed in any one of the preceding claims, in the
15 form of a total knee prosthesis.

13. A knee prosthesis as claimed in any one of the preceding claims, in the form of a uni-condylar knee prosthesis.

20 14. A knee prosthesis substantially as hereinbefore described with reference to Figures 1 to 3, or Figures 4 to 6, of the accompanying drawings.

Amendments to the claims have been filed as follows

CLAIMS

1. A knee prosthesis including a compressible meniscal or tibial component,
the meniscal and tibial components being separate parts and the meniscal component
5 being capable of anterior-posterior movement and/or rotational movement and/or
medial-lateral movement relative to the tibial component.
2. A knee prosthesis as claimed in claim 1, wherein the meniscal component
is capable of anterior-posterior movement relative to the tibial component.
- 10 3. A knee prosthesis as claimed in claim 1 or claim 2, wherein the meniscal
component is capable of rotational movement relative to the tibial component.
4. A knee prosthesis as claimed in any one of claims 1 to 3, wherein the
15 meniscal component is capable of medial-lateral movement relative to the tibial
component.
5. A knee prosthesis as claimed in any one of the preceding claims, wherein
the meniscal component comprises superior and inferior non-compressible layers of
20 wear resistant material and an intermediate compressible layer between the superior
and inferior layers.
6. A knee prosthesis as claimed in claim 5, wherein the superior and inferior
layers are of metal or ceramic material.

7. A knee prosthesis as claimed in any one of claims 1 to 4, wherein the tibial component includes a plateau having superior and inferior non-compressible layers and an intermediate compressible layer between the superior and inferior layers.
- 5 8. A knee prosthesis as claimed in any one of claims 5 to 7, wherein the compressible layer is formed of a biocompatible material.
9. A knee prosthesis as claimed in claim 8, wherein the compressible layer is formed of silicone elastomer.
- 10 10. A knee prosthesis as claimed in any one of the preceding claims, in the form of a total knee prosthesis.
11. A knee prosthesis as claimed in any one of the preceding claims, in the
15 form of a uni-condylar knee prosthesis.
12. A knee prosthesis substantially as hereinbefore described with reference to Figures 1 to 3, or Figures 4 to 6, of the accompanying drawings.



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Claims searched: 1-14

Examiner: Peter Davey
Date of search: 26 May 1999

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Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.Q): A5R (RAG, RAK)

Int CI (Ed.6): A61F 2/38

Other: Online: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	WO 94/02086 A1 (SIMON), see eg. claim 1 and Fig. 1	1 at least
X	EP 0046926 A1 (WALDEMAR LINK), see eg. claim 1 and Fig. 2	"
X	US 5704946 (U.S. MANUFACTURING CO.), see eg. claim 1	"
X	US 5645604 (SULZER), see eg. claim 1	"
X	US 5405398 (INTERMEDICS), see eg. claims 7 and 15	"
X	US 5092894 (KENNY), see eg. claim 1	"
X	WPI Abstract Acc. No. 95-149168 and FR 2710837 A1 (TORNIER), see abstract	"

X Document indicating lack of novelty or inventive step
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